PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

# PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

| | |
|---|---|
| **Date of mailing** (day/month/year)<br>01 September 1999 (01.09.99) | |
| **International application No.**<br>PCT/US98/27428 | **Applicant's or agent's file reference**<br>AD6547A |
| **International filing date** (day/month/year)<br>23 December 1998 (23.12.98) | **Priority date** (day/month/year)<br>24 December 1997 (24.12.97) |
| **Applicant**<br>KOBAYASHI, Toshikazu | |

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

02 July 1999 (02.07.99)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

**The International Bureau of WIPO**
**34, chemin des Colombettes**
**1211 Geneva 20, Switzerland**

Facsimile No.: (41-22) 740.14.35

Authorized officer

Jean-Marie McAdams

Telephone No.: (41-22) 338.83.38

2820586

REPLACED BY
ART 34 AMDT


## Claims

What is claimed is:

1. An antistatic polymer composition characterized in that it comprises:

(A) one or more polymers selected from the group consisting of polyester, polycarbonate, polyamide, polyoxymethylene, polyphenylene sulfide, and compounds of polyphenylene oxide and polystyrene;

(B) a polyether-system ion-conducting polymer;

(C) an ion source comprising: (i) a source of at least one carboxyl group or sulfo group being selected from the group consisting of hydrocarbon acids containing 6-54 carbon atoms, sulfonic acids and organic polymers with at least one bonded carboxyl group or sulfo group; and (ii) a source of at least one metal ion that is selected from the group consisting of sodium ion, potassium ion, lithium ion, magnesium ion, and zinc ion and that can react with the carboxyl groups or sulfo group of (i) , solid electrolytes or polymer electrolytes ; and

(D) a plasticizer of the aforementioned polyether-system ion-conducting polymer (B).

2. The antistatic polymer composition of Claim 1 characterized in that the polyether-system ion-conducting polymer (B) is a polyetherester amide.

3. The antistatic polymer composition of Claim 1 characterized in that plasticizer (D) of the polyester-system ion-conducting polymer (B) is a plasticizer represented by formula (1)

$$A-O-\left[\begin{array}{c}CH-(CH_2)_m-O\\ |\\ X\end{array}\right]_n-B \qquad (1)$$

wherein m is an integer of 1-3, n is an integer of 4-25, A is a $C_1$-$C_{10}$ alkyl, acyl, or aroyl, B is a $C_1$-$C_{10}$ alkyl, acyl, or aroyl, and X is H, $CH_3$, or $C_2H_5$.

4. The antistatic polymer composition of Claim 1 characterized in that it contains 40.0-98.4 wt% of polymer (A), 1.0-35.0 wt% of polyether-system ion-conducting polymer (B), 0.1-15.0 wt% of ion source (C), and 0.5-10.0 wt% of

plasticizer (D) with respect to the weight of the composition as a whole.

5. Moldings characterized in that they are molded from the antistatic polymer composition of Claim 1.

6. Transfer medium-separating guide parts for electrophotographic devices characterized in that they are molded from the antistatic polymer composition of Claim 1.

7. A molded article made from the composition of claim 4 having surface resistivity in the range of $10^{7}$ to $10^{13}$ ohms, as measured under ASTM D 257 and being applied an electrostatic painting directly on surface thereof.

8. An antistatic polymer composition characterized in that it comprises

(A) one or more polymers selected from the group consisting of ABS (acrylonitrile butadiene styrene), polyethylene, polypropylene, polypropylene copolymer and EPDM(ethylene/propylene/diene) elastomer;

(B) a polyether-system ion-conducting polymer;

(C) an ion source comprising: (i) a source of at least one carboxyl group or sulfo group being selected from the group consisting of hydrocarbon acids containing 6-54 carbon atoms, sulfonic acids and organic polymers with at least one bonded carboxyl group or sulfo group, and (ii) a source of at least one metal ion that is selected from the group consisting of sodium ion, potassium ion, lithium ion, magnesium ion, and zinc ion and that can react with the carboxyl groups or sulfo group of (i) , solid electrolytes or polymer electrolytes ; and

(D) a plasticizer of the aforementioned polyether-system ion-conducting polymer (B).

9. The composition of Claim 1 further comprising water-repellent comprising fluorinated compounds, silicone compound or a mixture thereof .

10. A molded article made from the composition of Claim 8.

## AMENDED CLAIMS

[received by the International Bureau on 15 June 1999 (15.06.99);
original claims 1, 2, 3, 4 and 8 amended;
remaining claims unchanged (3 pages)]

1. An antistatic polymer composition characterized in that it comprises:

(A) one or more polymers selected from the group consisting of polyester, polycarbonate, polyamide, polyoxymethylene, polyphenylene sulfide, and compounds of polyphenylene oxide and polystyrene;

(B) a ion-conductive polyether-based polymer;

(C) an ion source comprising: (i) a source of at least one carboxyl group or sulfo group being selected from the group consisting of hydrocarbon acids containing 6-54 carbon atoms, sulfonic acids and organic polymers with at least one carboxyl group or sulfo group; and (ii) a source of at least one metal ion that is selected from the group consisting of sodium ion, potassium ion, ammonium ion, lithium ion, magnesium ion, calcium ion, copper ion, and zinc ion and that can react with the carboxyl groups or sulfo group of (i) , solid electrolytes or polymer electrolytes ; and

(D) a plasticizer of the aforementioned ion-conductive polyether-based polymer (B).

2. The antistatic polymer composition of Claim 1 characterized in that the ion-conductive polyether-based polymer (B) is a polyetherester amide.

3. The antistatic polymer composition of Claim 1 characterized in that plasticizer (D) of the polyester-system ion-conducting polymer (B) is a plasticizer represented by formula (1)

$$A-O-\left[\begin{array}{c}CH-(CH_2)_m-O\\ |\\ X\end{array}\right]_n-B \qquad (1)$$

wherein m is an integer of 1-3, n is an integer of 4-25, A is a $C_1$-$C_{10}$ alkyl, acyl, or aroyl, B is a $C_1$-$C_{10}$ alkyl, acyl, or aroyl, and X is H, $CH_3$, or $C_2H_5$.

4. The antistatic polymer composition of Claim 1 characterized in that it

contains 40.0-98.4 wt% of polymer (A), 1.0-35.0 wt% of ion-conductive polyether-based polymer (B), 0.1-15.0 wt% of ion source (C), and 0.5-10.0 wt% of plasticizer (D) with respect to the weight of the composition as a whole.

5. Moldings characterized in that they are molded from the antistatic polymer composition of Claim 1.

6. Transfer medium-separating guide parts for electrophotographic devices characterized in that they are molded from the antistatic polymer composition of Claim 1.

7. A molded article made from the composition of claim 4 having surface resistivity in the range of $10^{7}$ to $10^{13}$ ohms, as measured under ASTM D 257 and being applied an electrostatic painting directly on surface thereof.

8. An antistatic polymer composition characterized in that it comprises

(A) one or more polymers selected from the group consisting of ABS (acrylonitrile butadiene styrene), polyethylene, polypropylene, polypropylene copolymer and EPDM(ethylene/propylene/diene) elastomer;

(B) a polyether-system ion-conducting polymer;

(C) an ion source comprising: (i) a source of at least one carboxyl group or sulfo group being selected from the group consisting of hydrocarbon acids containing 6-54 carbon atoms, sulfonic acids and organic polymers with at least one carboxyl group or sulfo group and (ii) a source of at least one metal ion that is selected from the group consisting of sodium ion, potassium ion, ammonium ion, lithium ion, magnesium ion, calcium ion, copper ion, and zinc ion and that can react with the carboxyl groups or sulfo group of (i), solid electrolytes or polymer electrolytes ; and

(D) a plasticizer of the aforementioned ion-conductive polyether-based polymer (B).

9. The composition of Claim 1 further comprising water-repellent

comprising fluorinated compounds, silicon compound or a mixture thereof .

10. A molded article made from the composition of Claim 8.

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PATENT COOPERATION TREATY

REC'D 08 FEB 2000
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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

| Applicant's or agent's file reference | FOR FURTHER ACTION | See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |
|---|---|---|
| AD6547A | | |
| International application No. | International filing date *(day/month/year)* | Priority date *(day/month/year)* |
| PCT/US98/27428 | 23/12/1998 | 24/12/1997 |
| International Patent Classification (IPC) or national classification and IPC | | |
| C08L67/02 | | |
| Applicant | | |
| E.I. DU PONT DE NEMOURS AND COMPANY et al. | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

| Date of submission of the demand | Date of completion of this report |
|---|---|
| 02/07/1999 | 04.02.00 |
| Name and mailing address of the international preliminary examining authority: | Authorized officer |
| European Patent Office<br>D-80298 Munich<br>Tel. +49 89 2399 - 0 Tx: 523656 epmu d<br>Fax: +49 89 2399 - 4465 | Ellrich, K<br><br>Telephone No. +49 89 2399 8295 |

Form PCT/IPEA/409 (cover sheet) (January 1994)

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US98/27428

## I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

**Description, pages:**

1-22 as originally filed

**Claims, No.:**

1-10 as amended under Article 19

2. The amendments have resulted in the cancellation of:

☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|---|---|---|
| Novelty (N) | Yes: | Claims 1-10 |
| | No: | Claims |
| Inventive step (IS) | Yes: | Claims 8,10 |
| | No: | Claims 1-7,9 |
| Industrial applicability (IA) | Yes: | Claims 1-10 |
| | No: | Claims |

2. Citations and explanations

**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

Reference is made to the following document/s/:

D1: US-A-3 839 245 (SCHLOSSMAN I ET AL) 1 October 1974
D2: EP-A-0 303 489 (TORAY INDUSTRIES) 15 February 1989
D3: PATENT ABSTRACTS OF JAPAN vol. 013, no. 461 (C-645), 18 October 1989 & JP 01 178554 A (KANEGAFUCHI CHEM IND CO LTD), 14 July 1989

## Section I.3:

1. There is no originally filed disclosure for adding ammonium, calcium and copper ions to the definition of compound (Cii). Even if there were a disclosure somewhere in the description, it could not be examined, since it was not part of the originally filed claims which was the basis of the search report.

2. Consequently, the examination is carried out as if said amendments had not been filed.

## Section VIII:

1. It is unclear whether the phrase "...and compounds of polyphenylene oxide and polystyrene" as used in claim 1 means only blends of these two polymers or also includes each polymer alone as component A).

2. It is unclear what is intended with the wording "...plasticizer **of** the aforementioned" polymer (claims 1/8).

3. The range of carbon atoms on p. 11, l. 19 is unclear and contradictory to the definition in claim 1.

## Section V:

1. D1 discloses antistatic compositions on the basis of compounds A), B) and D) (claims 1/8).

2. According to the examples (PE1/CE4 of Tab. 1) the addition of C) leads to an increased conductivity.

3. It was, however, generally known that the addition of ions to a ion-conductive polymer containing composition will increase the conductivity, furthermore D2 (p.6, l. 15-16) already demonstrate an improve antistatic effect linked with the addition of C) to such polymers.

4. Consequently, claims 1-7 and 9 lack an inventive step.

5. D3 (representing the closest prior art for claims 8 and 10) discloses antistatic compositions on the basis of compounds A), B) and C).

6. The present examples (PE1/CE5 of Tab.1) demonstrate an increased conductivity linked with the presence of a plasticizer D).

7. Since the cited literature gives no incentive to use plasticisers in order to enhance the conductivity of polymer compositions, claims 8 and 10 fulfil the requirements of Arts. 33(2) and 33(3) PCT.

PATENT COOPERATION TREATY

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## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| Applicant's or agent's file reference | **FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below. | |
|---|---|---|
| AD6547A | | |
| International application No. | International filing date *(day/month/year)* | (Earliest) Priority Date *(day/month/year)* |
| PCT/US 98/ 27428 | 23/12/1998 | 24/12/1997 |
| Applicant | | |
| E.I. DU PONT DE NEMOURS AND COMPANY et al. | | |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

[ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

[ ] contained in the international application in written form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readble form.

[ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

[ ] the text is approved as submitted by the applicant.

[X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. ////

[ ] None of the figures.

[ ] as suggested by the applicant.

[ ] because the applicant failed to suggest a figure.

[ ] because this figure better characterizes the invention.

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

To provide an antistatic polymer composition that can manifest a uniform antistatic effect permanently with little change in the surface resistance of moldings owing to humidity. Along with a polyether-system ion-conducting polymer, an ion source e.g. comprising a source of carboxyl groups and a source of at least one metal ion that can react with these carboxyl groups and a plasticizer of the ion-conducting polymer are compounded in one or more polymers selected from the group consisting of polyester, polycarbonate, polyamide, polyoxymethylene, polyphenylene sulfide, compounds of polyphenylene oxide and polystyrene, ABS, polyethylene, polypropylene and EPDM.

# INTERNATIONAL SEARCH REPORT

[redacted]

International Application No
[redacted]/US 98/27428

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C08L67/02 C09K3/16 C08L69/00 C08L77/00 C08L81/02
C08L55/02 C08L23/06 C08L23/16 C08L71/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C08L C09K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | US 3 839 245 A (SCHLOSSMAN I ET AL)<br>1 October 1974<br>see column 12, line 43-44; claims 1,8 | 1-7,9 |
| A | EP 0 303 489 A (TORAY INDUSTRIES)<br>15 February 1989<br>see page 6, line 15-16 | 1 |
| A | PATENT ABSTRACTS OF JAPAN<br>vol. 013, no. 461 (C-645), 18 October 1989<br>& JP 01 178554 A (KANEGAFUCHI CHEM IND CO LTD), 14 July 1989<br>see abstract | 8,10 |
| A | US 4 548 978 A (GARRISON JR WILLIAM E)<br>22 October 1985<br>see claims 1,11-13 | 1,3,8 |

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 19 April 1999 | 27/04/1999 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax: (+31-70) 340-3016 | Voigtländer, R |

1

Form PCT/ISA/210 (second sheet) (July 1992)

# INTERNATIONAL SEARCH REPORT

[redacted]

International Application No
[redacted]/US 98/27428

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication,where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | EP 0 242 158 A (TORAY INDUSTRIES)<br>21 October 1987<br>see page 17, line 8; claim 1 | 1,2 |
| A | EP 0 149 091 A (MOBAY CHEMICAL CORP)<br>24 July 1985<br>see claim 1 | 1 |
| A | US 3 636 135 A (GARFORTH JOHN DAVID)<br>18 January 1972<br>see claim 1 | 1 |
| A | US 4 218 549 A (BURZIN KLAUS ET AL)<br>19 August 1980<br>see claim 1; example 4 | 1 |
| A | EP 0 613 919 A (SANYO CHEMICAL IND LTD)<br>7 September 1994 | 1,8 |

1

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
/US 98/27428

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
/US 98/27428

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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| EP 0613919 A | 07-09-1994 | JP 2538512 B | 25-09-1996 |
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